Title: Diagnostic Decision Making: The Last Refuge for General Practitioners?

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Abstract

Nurses and pharmacists gained the right to prescribe as independent prescribers in the UK in 2007. Independent prescribers are responsible for the initial assessment of patients with diagnosed and undiagnosed conditions. Public policy discourse and the views expressed by health care professionals have conceptualised diagnostic decision making as being at a 'higher level' and more difficult than prescribing decision making. This paper presents five themes related to this premise. Firstly diagnostic decision making is put into the broader context of clinical reasoning which underpins all types of clinical decisions including both diagnostic and prescribing decisions. Secondly, the nature of diagnostic decision making is discussed as to whether it is indeed separable from the prescribing decision making process. Thirdly, the conception that all diagnostic decisions are inherently more difficult is contested when difficulty in decision making is more appropriately applied to all types of clinical decisions which involve greater complexity and uncertainty. The fourth topic concerns whether this perception of diagnoses as being more difficult is a response by the medical profession to the threat of independent prescribing, reflecting their wish to maintain professional power and dominance over other professions. The final section considers how expertise in diagnoses could be developed in nurse and pharmacist independent prescribers. To develop their expertise in making accurate diagnoses, medicine uses the model of learning basic science mechanisms followed by engagement with patient clinical problems followed by years of clinical experience. However this may be just one way of achieving

diagnostic expertise. Other approaches, such as the use of deliberate practice and feedback, may be more suitable to the diverse range of knowledge and experiences of nurse and pharmacist prescribers.

Introduction

In the UK, appropriately trained nurses and pharmacists have been able to legally sign prescriptions for prescription-only medicines since 2004. This followed from the Crown Report in 1999 which recommended that the 'legal authority to prescribe should extend beyond currently authorised prescribers' (Department of Health, 1999, pp. 36). Legislative changes in 2003 led to the extension of prescribing authority to nurses and pharmacists with the introduction of supplementary prescribing in 2004 (Department of Health, 2005) and with further legal changes in 2006, to allow nurse and pharmacist independent prescribing in 2007 (Department of Health, 2006). Previously both nurses and pharmacists had been able to advise medical practitioners on medicine use and, particularly in community pharmacies, to provide advice on over-the-counter medicines. However these changes were a major shift in policy which enabled health care professionals, other than a doctor or dentist, to have legal authority to write prescriptions for the full range of prescription-only medicines including, for nurses, controlled drugs. The aims of these developments were to give patients quicker access to medicines, to decrease general practitioners' workload and to better use the skills of nurses and pharmacists (Department of Health, 2005).

Supplementary prescribing is described as 'a voluntary partnership between the responsible independent prescriber (a doctor or a dentist) and a supplementary prescriber (nurse or pharmacist) to implement an agreed patient specific clinical management plan with the patient's

agreement' (Department of Health, 2005, pp.11). The clinical management plan details, amongst other issues, the types of medicines to be prescribed, limitations or restrictions on prescribing, relevant warnings and the circumstances under which the supplementary prescriber should refer or seek advice from the independent prescriber. In 2006, independent prescribing (IP) by nurses and pharmacists was introduced with the independent prescriber defined as the 'practitioner responsible and accountable for the assessment of patients with undiagnosed or diagnosed conditions and for decisions about the clinical management required, including prescribing' (Department of Health, 2006, pp.2). As independent prescribers, nurses and pharmacists are no longer required to use clinical management plans, although many in practice will use condition-specific protocols or guidelines to inform, and limit, the range of medicines they feel competent to prescribe.

Anxieties raised by doctors to these new roles have centred on concerns about patient safety and that nurses and pharmacists lack training in diagnosing (British Medical Association, 2005; Day 2005). More moderate medical voices have expressed a need for appropriate training, support and governance for new prescribers but that it could benefit patients (Avery & Pringle, 2005). Other authors expressed fears over new prescribers taking on a diagnostic role and that patients could be endangered by 'the reckless expansion of nurse and pharmacist prescribing' (Anonymous, 2006). Making diagnoses has been called the most important responsibility carried out by medical doctors (Gutkin, 2009) and that diagnosis is almost the only skill that still defines them

(Godlee, 2008). On the other hand, the changes in the types of activities traditionally carried out by doctors and nurses have been noted by Ghislaine Young, a nurse practitioner and salaried partner in a GP practice (Young, 2005). She has argued that the distinction between medicine (diagnosis and cure) and nursing (care) has become increasingly blurred and, further, that professional groups should work together to enhance the care of patients.

Research exploring the views of medical doctors about nurse and pharmacist prescribing have found that, although they were generally positive about the role of new prescribers, some expressed concern about nurses' and pharmacists' ability to diagnose (Child & Cantrill, 1999, Bissell et al., 2008, Stewart et al., 2009, Weiss et al., 2006). Doctors acting as mentors for pharmacist prescribers expressed concern about boundary encroachment and medical deskilling. They preferred the model of supplementary prescribing where they could retain ultimate control over the process by setting barriers within which pharmacists could prescribe (Lloyd & Hughes, 2007). Similar views were expressed by doctors working in secondary care who wanted to set limits to nurse and pharmacist prescribing by only allowing them to work within protocols (Buckley et al. 2006). In Bissell's (2008) study, diagnosing by doctors was considered to be a 'more skilled, uncertain and difficult task' with prescribing seen as a lesser task than 'de novo' diagnosis (Bissell et al., 2008, pp. 57). Evidence from the evaluation of nurse and pharmacist supplementary prescribing suggested that prescribing was considered by doctors to have diminished as a skilled practice and, with the widespread use of protocols, much of it

was considered routine. These doctors saw their role, with its superior knowledge, training and experience, to be reserved for diagnosis and *plus ultra* prescribing (Cooper et al., 2011).

Views of nurse and pharmacist prescribers in previous research have echoed similar reservations about diagnosis. In an evaluation of pharmacist supplementary prescribing, while many new prescribers were keen to become independent prescribers, the reason for this was not so they could diagnose, but rather so they could avoid the need for individual patient clinical management plans. Some of these new prescribers had no desire to take on the diagnosis of new conditions and felt unqualified to do so (Lloyd et al., 2010, Weiss et al., 2006). In Luker's early evaluation of nurse prescribing, nurses expressed fear about making an incorrect diagnosis, although this research took place before the introduction of supplementary prescribing and was during the time when nurses were able to prescribe from a limited formulary (Luker et al., 1997).

Supplementary prescribing may have been more acceptable to doctors given the framework in which it was conducted with patient-specific clinical management plans. This arrangement allows doctors to retain control over the process (hence the earlier word used for supplementary prescriber was a 'dependent' prescriber) and circumscribed the area of clinical practice for the new prescriber (Lloyd & Hughes, 2007). The word supplementary implies something both sub-ordinate and non-essential. In this sense both context and terminology are important. In policy documents the distinction between supplementary prescribing and

independent prescribing created an explicit hierarchy between diagnostic decision making and prescribing decision making, privileging the superiority of diagnosis as a cognitive decision making process. The responses of health care professionals noted above reinforce this distinction and suggest that such an assumption may be pervasive. There are several issues, related to this concern about diagnostic decision making, that this paper seeks to address: (1) to provide some background into what is meant by diagnostic decision making and how this relates to broader issues of clinical reasoning, (2) to consider whether diagnostic decision making is truly able to be regarded as a separate process distinct from prescribing, and other, patient management decision making, (3) to suggest that it may be more appropriate to focus on 'difficult' clinical decisions, which includes diagnostic as well as other patient management decisions, rather than diagnostic decisions per sé, (4) to consider the threat to the medical profession posed by nurse and pharmacist independent prescribers who may wish to diagnose and, finally (5) to explore educational and cognitive psychology perspectives on the development of diagnostic expertise amongst nurse and pharmacist prescribers.

While prescribing by allied health care professionals has also been implemented, this paper will explicitly take the perspective of nurse and pharmacist prescribing in a UK primary care setting.

Diagnostic Decision Making

Elstein and Schwartz describe diagnosis as a process of generating one or more hypotheses, using these to predict what additional findings should be present and undertaking further data collection to test out these hypotheses (Elstein & Schwartz, 2002). This hypothetico-deductive approach generates hypotheses early during the initial presentation of a problem and draws upon existing knowledge, associations and experience of the medical doctor (Round, 2000). This process of generating hypotheses and drawing upon existing knowledge, associations and experience is part of the process of clinical reasoning (Norman et al., 2009). Clinical reasoning also informs other kinds of clinical decisions including decisions about management such as treatment or referral decisions as well as the interpretation, and weight given to, clinical research evidence. Experience and knowledge both inform clinical reasoning and are influenced by previous applications of it. For the purposes of this paper, clinical reasoning will be used as the broader term and the underlying process informing all types of clinical decisions including diagnostic decisions, as well as prescribing decisions, referral decisions or other decisions about management. Clinical reasoning is usually seen as encompassing both analytic and non-analytic processes, both of which will be reviewed here.

In the analytic model, medical work is seen as a logical, step by step cognitive process such that when a doctor is confronted with a particular patient situation, details of the patient problem are compared with professional knowledge. In this model the key elements are the professional's knowledge, cognitive capacities and limitations and the data

required for diagnosis and intervention (Berg, 1997). This analytic approach characterises the decision as a two-stage process. The first stage consists of collecting and analysing the evidence with regard to benefits, harms and costs of each potential outcome option. The second stage consists of comparing the desirability of the different outcomes of each option (Eddy, 1990). In the analytic model, these processes are performed explicitly or implicitly, may be subject to imperfect clinical information and (if so) are likely to require subjective professional judgement. Analytic models include those which use Bayes' Theorem, where a priori probabilities associated with the known prevalence of a diagnosis and the conditional probabilities associated with each sign or symptom with each diagnosis are used to calculate the probability of each diagnosis under consideration (Elstein & Schwartz, 2002; Eva, 2004). This approach assumes that causal rules linking clinical features to diagnoses can be extracted from clinical practice and that, with experience, these rules can become more refined and attuned to reality (Eva, 2004).

The non-analytic model, which comprises pattern recognition or direct automatic retrieval models, compares a current patient situation to past patient cases (or abstractions of such) to make a judgement as to the probability that a particular case belongs to a specific diagnostic category. A new case is categorised by its resemblance to memories of instances previously seen (Brooks et al., 1991) or to a more abstract prototype (Elstein & Schwartz, 2002). While usually termed a non-analytic model, a more accurate description may be that such reasoning is rapid and unconscious/subconscious, but nonetheless still analytic. Some authors

suggest that the ability to use pattern recognition increases with experience and expertise, as novice decision makers have no experience to draw upon (Luker et al., 1998) but rather base their decisions on taught procedures and guidelines (Benner, 1982). Novices think analytically through guiding principles whereas experts can make decisions 'intuitively' through rapid, unconscious or subconscious analytic processes. However other research has shown no qualitative difference between the reasoning strategies used by junior medical students compared with experienced doctors (Neufeld et al., 1981).

The interplay between age (or clinical experience) and clinical reasoning is complex. A systematic review of the relationship between clinical experience and quality of care found that increasing experience resulted in a decline in performance as measured by physician clinical knowledge, adherence to guidelines and in some patient outcomes (Choudhry, et al., 2005). Other evidence suggests that increasing age may result in increased non-analytic thinking without a loss of diagnostic accuracy (Eva et al., 2010; Groves et al., 2003). More experienced doctors may be more likely to consider less common or less stereotypical conditions and more able to integrate complex, social and behavioural information (Feltovich 1981; Elstad et al., 2010). However age can also result in reliance on data gathered early in the consultation and less willingness to re-assess a diagnostic decision when presented with new information (Eva & Cunnington, 2006).

Recently Norman et al. (2009) have developed the idea of iterative diagnosis which draws upon elements from both the analytic and non-analytic models of reasoning. Drawing upon the original hypo-thetico-deductive model by Elstein and Schwartz (2002), the process involves the clinician generating hypotheses (often impressionistically using non-analytic reasoning). These are then iteratively tested through additional patient questioning for their alignment with the clinician's clinical knowledge and experience using analytical reasoning. According to Norman et al. (2009) analytic and non-analytic reasoning usually integrate smoothly and unconsciously throughout the decision making process and subsequent consultation interaction.

The literature on clinical reasoning recognises that human beings are subject to cognitive biases or errors through the use of heuristics or cognitive shortcuts which try to make the complex more simple (Hall, 2002). Heuristics can be seen as a highly adaptive and appropriate response to complex decision making in the real world. However heuristics are more often viewed negatively and seen as the process through which clinical evidence becomes biased or weighted inappropriately. Authors acknowledge that heuristics are most commonly employed when making judgements under uncertainty (Tversky & Kahneman, 1974, Hall 2002). These include the availability bias where the probability of an event (or diagnosis) occurring is rated more likely if it can be related to a case easily recalled. There is the confirmation bias which directs the line of questioning towards confirming the diagnosis under consideration instead of investigating evidence which may refute it (Norman et al., 2009). A

third example is the framing bias where patients are swayed to give answers to questions which support a diagnosis because of the way in which a particular question has been asked. The consequence of these biases can be an inaccurate diagnosis due to premature closure of questioning without the critical data having been collected (Norman et al., 2009).

Hamm (1988) views analytic and non-analytic clinical reasoning as being on a continuum while more recent experts suggest that the optimal form of reasoning is an additive model in which both analytic and non-analytic processes play a role (Eva, 2004). However, as noted by Eva, accuracy of diagnoses relies not only on being able to draw upon a range of analytic and non-analytic strategies, but also the context within which a problem is encountered. Context in this sense includes the clinical setting, recent cases and personal factors such as clinician experience and the current state of medical opinion (Eva, 2004). The influence of social and psychological factors (e.g. patient recently bereaved, consultation before a holiday weekend) on doctors' decision making has been widely recognised (Howie, 1976; Katz, 1985), as has the importance of considering how social, psychological and biological systems influence diagnostic certainty (Lutfey & McKinlay, 2009).

Having considered some of the key features of the clinical reasoning process, I will now consider the intertwined nature of how diagnostic and prescribing decisions are made.

Howie (1972) was one of the first investigators to hypothesise that a treatment decision might be derived directly from signs, symptoms and investigations without the intervening stage of a diagnostic decision. Conventional wisdom suggested a sequential process involving a diagnostic decision followed by a treatment decision but Howie's radical proposition was that a diagnostic label was less a reason for treatment but rather a justification for it (Howie, 1972). Howie found that diagnostic labels had a poorer predictive value for antibiotic treatment than the original symptoms-sign complex. In a follow-up study using simulated patients, Howie found that doctors required less information to make a decision on management than to make a diagnostic decision (Howie, 1974). He notes that a decision to prescribe an antibiotic relates less to a decision on diagnosis but rather to a decision not to prescribe an antibiotic. Indeed, non-analytic reasoning may play a part in such processes where diagnoses are generated impressionistically (and potentially unconsciously) and are used to inform clinical management decisions. However these findings also suggest that there is not a separate process of clinical reasoning used to inform diagnostic decisions which is distinct from those processes informing the decision to prescribe. Privileging the aspect of clinical reasoning which informs diagnostic decisions, as noted in the comments by the medical profession described earlier, may not be appropriate given that these same processes inform decisions to prescribe.

Further evidence of the complex relationship between diagnostic and treatment decision making comes from Bloor's study of ENT specialists (Bloor, 1976; Bloor, 1978). He found that ENT specialists', when assessing children's suitability for possible adeno-tonsillectomy surgery, did not make decisions by considering and weighing up all the available information. Rather the specialists used a series of specifically situated routines which were used 'to construct images of the clinical signs, symptoms and circumstances of each patient' (Bloor, 1976, pp.45). These routines, which varied widely between each specialist, were the means by which they rendered 'unproblematic their decisions on patient disposal' (Bloor, 1976, pp.45). For example, the specialists differed in what signs were considered important, how important these signs were weighted, how specific and extensive their search procedures were and the decision rules used to denote whether or not surgery was indicated. Other general properties of decision making noted by Bloor were its repetitive, routinised and idiosyncratic nature, and its orientation towards action (Bloor, 1978). Evidence-based medicine can be seen as a development which sought to address this variability in specialists' use of routines. In addition these findings suggest there may be considerable overlap in the processes of clinical reasoning used to make diagnostic and management decisions.

The intertwined nature of diagnosis and treatment decisions was also found by Berg (1992) in his ethnographic study of medical action in practice. He noted that the phased two-step motion of searching for a diagnosis and then deciding upon treatment did not hold. The process of

transforming the presenting patient problem into a solvable patient problem is:

> 'uni-directionally geared towards the construction of disposal. 'Diagnosis' and 'therapy' are terms which can be applied to this process in retrospect, but in an 'in situ' study of medical practice the usage of these terms creates an artefactual distinction' (pp.169).

Berg describes how medical disposals are socially constructed such that the type of questions asked, the way they are asked and the doctor's interpretation of the patient's answers shape the symptoms, historical and examination patient data towards a solvable problem. Patient data is recast and reconstructed into a pattern which aligns with the considered transformation. Some patient data may be ignored, devalued or emphasised in the course of medical interaction in the quest towards constructing a medical disposal (Berg, 1992). This may be because doctors have generated diagnostic hypotheses through non-analytic reasoning and these are (unconsciously) guiding their selective use, and emphasis on, patient data. Atkinson (1995) similarly noted the social and interactional nature of medical decision making where decisions may be subject to debate, negotiation and revision. He considers the sequential ordering of the decision making process from the gathering of patient information to diagnosis to treatment to be troublesome. Even 'objective' information such as laboratory test findings are the outcome of a process of decision making and are themselves judgements mediated by the interpretations and values attached to them in collegial discourse

(Atkinson, 1995). This body of evidence underscores the dynamic nature of medical decision making, the constant revision of diagnostic and management decisions in the light of new information, and the falsity in trying to ring fence the reasoning process involved in making diagnostic decisions as separate from decisions about prescribing or management. This suggests that doctors when making decisions which may appear overtly management oriented may have made a diagnostic decision using rapid non-analytic reasoning to underlie that management decision. Equally, it may be that nurse or pharmacist prescribers when acting in their role, even as a supplementary prescriber, to make a decision about clinical management, may have done the same.

Not all Diagnoses are Created Equal

The previous section explored some of the evidence around the dynamics of the clinical reasoning process and how diagnostic decisions are deeply intertwined with decisions about management. This section will explore a range of diagnostic decisions and will argue that it is not, as noted in the introduction, that diagnostic decisions are intrinsically more difficult than prescribing decisions. Rather there are features, involving complexity and uncertainty, which are associated with some clinical decisions (e.g. both diagnostic and management) that makes them more difficult or challenging for the practitioner to make.

Clinical decisions occur in many contexts and are undertaken by both health care professionals and lay people. Self care, in terms of managing

minor ailments and long term conditions, is high on the NHS agenda (Nazareth & Murray, 2010). Whether clinical reasoning is viewed within an analytic or non-analytic framework, the process where an individual compares their signs and symptoms with their medical (or lay) knowledge of the condition, can be viewed as engaging in a process of diagnostic decision making. Bloor and Horrobin (1975) note that patients prior to coming to see a doctor are expected to assess their own symptoms and seek appropriate self-care, and yet become passive and deferential once they enter the surgery. This, the authors suggest, places patients here in unique 'double bind' situation. Patients need to self diagnose their symptoms and decide, using their personal knowledge, experience and lay referral networks, upon an appropriate course of action. This might include self care or a visit to the GP. If the patient decides to seek help from the GP, they are then expected to defer to the clinical reasoning and course of action decided by the GP.

Community pharmacists undertake a similar cognitive diagnostic process to patients when they provide advice and recommend over-the-counter medicines in response to patient requests for advice about particular symptoms (Tully et al., 1997). Community pharmacists have a well described role in managing minor ailments and responding to patient symptoms (Hassell et al., 2000). Evidence from cognitive psychology suggests that where decisions are routine and repeated often, as in the case with customers consulting pharmacists about common situations needing minor ailment advice, they are easier as they require less effort and little deliberation (Lehto & Nah, 2006). The cognitive load or burden

associated with a decision is also less when the presenting information has already been organised into schemata and stored in long term memory (van Merrienboër & Sweller, 2005). Such schemata reduce the burden on working memory which is both capacity and time limited. In clinical practice the storage of complex schemata is likely to be aided by previous exposure to protocols, guidelines or flow diagrams which exist for many clinical conditions and help organise incoming information. When a customer requests advice on a common minor ailment, familiarity and existing protocols and procedures relevant to the encounter are likely to reduce the cognitive load on the pharmacist's decision making process. Also potentially influencing the effort required is that decisions regarding minor ailments involve an acute self-limiting condition, and thus involve minimal uncertainty about the outcome (e.g. the patient is likely to get better regardless).

These 'easier' diagnostic decisions can also occur with some chronic conditions such as hypertension. Current guidance from the British Hypertension Society and the National Institute for Health and Clinical Excellence states that a diagnosis of uncomplicated hypertension is made when three readings above 140/90mm Hg are obtained on three separate visits (National Institute for Health and Clinical Excellence, 2006). Lifestyle or pharmacological interventions may be initiated, depending upon the patient's level of cardiovascular risk. This, like the example above, relies on an existing schemata (a hypertension guideline) which helps organise presenting information and exerts less cognitive load on working memory (van Merrienboër & Sweller, 2005). An increasing number of novel

elements to process increase the burden on working memory and makes decision making more difficult. Uncertainty is also one of the primary reasons why decisions can be difficult (Lehto & Nah, 2006). As described by Light (1979), there are different kinds of uncertainty: that arising from incomplete mastery of knowledge, that arising from indeterminacy of the clinical area itself and, as noted by Fox (1957), not being able to determine the difference between imperfect mastery of available knowledge and imperfections in the knowledge in the clinical area itself. Uncertainty can be exacerbated when there is complexity, for example when there is a lack of clarity in terms of patient presentation (e.g. atypical patient presentation or lack of symptom specificity to a particular illness) and / or increased complexity of the patient situation (e.g. the presence of co-morbidities or a complicated patient social situation). Increasing uncertainty and complexity require greater deliberation and impose a greater cognitive load on a practitioner's decision making. This may lead to the practitioner seeking additional information from the patient or to use the cognitive biases or heuristics described earlier (Round, 2000; Tversky & Kahneman, 1974). Intuitive decisions made under conditions of uncertainty are prone to cognitive biases and may lead to error (Norman, et al., 2009; Hall, 2002).

A Threat to Medical Dominance?

The arguments put forward so far have suggested that the process of making diagnostic and treatment decisions are intertwined within the process of clinical reasoning and are not separable as distinct reasoning

entities. Further that it is not diagnosis itself that is difficult but rather clinical decisions, both diagnostic and management, that involve greater complexity and uncertainty which are the more cognitively challenging. In considering the reasons why doctors may consider diagnostic decision making to be superior to other forms of clinical reasoning, one obvious interpretation is that they feel threatened by the expansion of nurses and pharmacists into prescribing roles. They wish to maintain control over diagnostic decision making so they can retain control over the prescribing process. Analogous to Pope's argument on medicine's response to the evidence based medicine movement (Pope, 2003), medicine's response to new prescribers' expansion into diagnostic decision making could be viewed as a 'last stand' and wish to maintain power in the face of external threats.

Abbott (1988) discusses how professionals, such as nurse and pharmacist prescribers, make jurisdictional claims to an area of practice previously under full jurisdictional control of the medical profession. As independent prescribers, nurses and pharmacists can be seen as making a jurisdictional claim to engage in diagnostic decision making. The outcome of such jurisdictional claims is mediated through interactions between the various stakeholders at the public, legal or workplace level (Abbott, 1988). The public outcry by doctors regarding diagnostic decision making may reflect their desire to maintain their jurisdictional boundaries, done in a manner designed to enlist the support of the wider public. Equally, nurses and pharmacists, under the dominance of medicine, may feel uncomfortable encroaching on territory identified with doctors and may

self-limit their areas of practice by indicating their unwillingness to engage in diagnoses (Bissell et al., 2008, Weiss et al., 2006, Lloyd & Hughes, 2007).

Previous researchers have investigated the threat posed by nurse and pharmacist prescribers (Fisher, 2010, Weiss & Sutton, 2009, Cooper et. al., 2011). These researchers concluded that power relationships still played a part and that the dominance of medicine has not been threatened. Allsop (2006) has suggested that medicine has accommodated to change resulting from the introduction of new prescribers and has maintained overall control of patient management. Cooper et al. (2011), in their evaluation of nurse and pharmacist supplementary prescribing, identified five ways of working which supported the continued dominance of medicine. These included: patients' and supplementary prescribers' views of doctors as being hierarchically superior; doctors' initial legitimation of nurses' and pharmacists' prescribing; doctors' belief that they could control, particularly nurse, prescribers' access to training; nurse and pharmacist prescribers' frequent recourse to seeking advice from doctors (and doctors' encouragement of this); and doctors' denigration of most routine prescribing, making it therefore more suitable for nurses and pharmacists to undertake (Cooper et al., 2011). However, this study and the previous studies have only explored the dominance of medicine under supplementary prescribing arrangements (or earlier nurse prescribing arrangements). With the introduction of independent prescribing, and the more explicit possibility for nurses and pharmacists to make diagnoses,

doctors may indeed feel under threat especially when, under pressure from supplementary prescribing, doctors made much of the skill and defining nature of diagnosing as key to their role (Cooper et al., 2011).

Developing Expertise

Nonetheless, it is important to consider the evidence regarding pharmacists' and nurses' ability to diagnose and prescribe, and whether they are safe prescribers. In Latter et al.'s (2007) study of the clinical appropriateness of nurse prescribing, nurses were found to be generally making clinically appropriate decisions. However some negative comments were made by the medical doctors on the expert panel which questioned nurses' assessment and diagnosing skills. However, the method used annotated transcripts of nurse consultations and some examples of incomplete assessment may have been because nurses did not verbalise their assessments. Concerns have been expressed about nurses' knowledge of pharmacology (Morrison-Griffiths et al., 2002, Buckley et al., 2006, Offredy et al., 2008, Cooper et al., 2008), pharmacists' lack of training in clinical examination skills and diagnoses (Weiss et al., 2006, Hoti et al., 2010, Cooper et al., 2008), variations in the preparation and academic qualifications of nurses going on prescribing courses (Latter & Courtenay, 2004) and pharmacists' lack of contact with patients (Buckley et al., 2006, Child et al., 1998). However, there is also some evidence, although not extensive, supporting the decision making skills of nurses and pharmacists. In addition to the study above (Latter et al., 2007), other research has found that nurses wrote prescriptions to a high

standard with most prescriptions determined to be appropriately and safely prescribed (Drennan et al., 2009). In their assessment of the safety and appropriateness of nurse and pharmacist prescribing, no errors were identified across the 71 medicines prescribed and prescriptions were judged overall to be appropriate (Bissell et al., 2008). The clinical effectiveness and costs of mental health nurse supplementary prescribers compared with psychiatrists' prescribing, similarly found no difference between the two groups (Norman et al., 2010). Evidence also suggests that nurse and pharmacist prescribers, in comparison with doctors, are more likely to adhere to guidelines (Shulman & Jani, 2005, MacDonald et al., 2005).

Underlying nurses' and pharmacists' performance as prescribers is their training which has a strong emphasis on competence. The first required learning outcome for pharmacist prescribing courses states independent pharmacist prescribers should be able to:

> 'Understand the responsibility that the role of independent prescriber entails, be aware of their own limitations, and work within the limits of their professional competence – knowing when and how to refer / consult / seek guidance from another member of the health care team' (General Pharmaceutical Council, 2010, pp.1).

In nursing, section 2, practice standard 2.2 of the Standards for Prescribing Practice states that 'you must only ever prescribe within your level of experience and competence' (Nursing & Midwifery Council, 2010,

pp.29). The emphasis put upon competence, coupled with the dominance of a patient safety agenda within the culture of the NHS, has meant that self-limitation and restraint in terms of breadth of prescribing, has become a professional ideal for some new prescribers (Weiss & Sutton, 2009). Restrictions to the range of clinical areas in which prescribing occurs and the use of protocols to guide prescribing decisions facilitate new prescribers' competence in their areas of practice. This also makes possible the development of doctors' overseer role in patient management, helps maintain doctors' overall control over the prescribing process and preserves their higher status (Allsop, 2006). However with the maturation of nurse and pharmacist prescribing and the potential for their expertise to develop, as well as anecdotal examples of nurses and pharmacists who have expanded their areas of practice (Young, 2005, Anonymous, 2004, Anonymous, 2009, Coombes, 2008, Tomlin, 2009, Sibbald, 2008), it is uncertain how long doctors' control over patient management will be maintained.

The traditional approach to medical clinical teaching, and the development of diagnostic expertise, consists of two stages: mastery of basic biomedical sciences followed by the assessment of patient clinical problems (Eva, 2004). Experience, following on from medical training, is recognised as important to the development of expertise. As noted by Freidson (1970), medical knowledge is justified in terms of the doctor's personal knowledge and their professional experience. This practical reasoning is resistant to change on the basis of abstractions or statistical considerations (Freidson, 1970). Clinical experience is seen as an

important source of control over uncertainty, with the ultimate respect given to judgement based on experience (Light, 1979). Increasing age, correlating with increasing expertise, has been shown to increase reliance on non-analytic clinical reasoning (Elstad et al., 2010), with GPs identified as diagnostic experts relying on relatively few elements of clinical data (Groves et al., 2003).

The importance and salience of experience has been contested in more recent years with the work of Archie Cochrane, David Sackett and the rise of evidence-based medicine (EBM). Cochrane supported the use of randomised controlled trials, where appropriate, to test the effectiveness of medical interventions and for these findings to guide clinical decision making (Cochrane, 1972). The emphasis on identifying, appraising and implementing relevant clinical research into individual patient management situations was further refined by David Sackett and central to the evidence-based medicine movement (Sackett et al., 1996). What the evidence based movement proposed was that clinical experience may not be the best method of developing expertise and that EBM with its 'conscientious, explicit and judicious use of current best evidence' in making decisions about patients (Sackett et al., 1996, pp.71), is a more robust method of developing clinical expertise.

Ericsson and Towne (2010) take a cognitive psychology approach to the study of expertise. They describe two distinct perspectives, one of which is the traditional approach, or accumulated experience model, where expertise is developed through increased training and experience over a

period of years. This model has been criticised because the relationship between increasing experience does not correlate in a linear fashion with increasing expertise. At a certain point, performance reaches a level of automaticity and is effortless, and increasing experience will not improve accuracy further. The second approach, called expert performance, focuses on individuals who have superior performance at reproducible tasks that capture the expertise representative of a particular domain such as medicine. In this model, experts, such as doctors, have superior anticipation skills and more refined cognitive representations which enable them to access and execute appropriate actions quickly. These representations are stored in long-term memory but, because they can be rapidly accessed like short term working memory yet are not likewise capacity-limited, this storage / retrieval aspect of memory has been called long term working memory. Most intriguingly, this expert performance approach can be enhanced through 'deliberate practice' where an individual intensely concentrates on a specific aspect of performance which leads to modification of the mechanisms responsible for improvement. In this model, informative feedback and coaching are key to the development of expertise. In medicine this could include expert performers working through descriptions of previous diagnostic situations where the correct outcome is known so that they receive immediate feedback on the accuracy of their decisions (Ericsson & Towne, 2010).

In contrast to the medical training model of the learning of basic sciences followed by engagement with patient clinical problems, the nurse and pharmacist prescribing training model emphasises competence. This

emphasis on competence is at least in part necessary due to the diverse knowledge, qualifications and experiences of the nurses and pharmacists who may decide to become prescribers. For the development of further expertise, evidence suggests that for nurse and pharmacist prescribing to succeed, they need support from peers (through professional networks, multidisciplinary working and collaborative practice), they need good mentorship arrangements with doctors and they need to have access to continuous professional development (Cooper et al., 2008, Weiss et al., 2006, Stewart et al., 2009, Carey, et al. 2009, Otway, 2001, Bradley et al., 2007). Alongside these, the methods for developing expertise previously mentioned including increased clinical experience, use of tools derived from evidence-based medicine, and enhancement through 'deliberate practice' are also likely to play a role.

Medical educators have similarly recognised that there might be a number of routes for developing expertise (Eva, 2004). Eva (2004) suggests that there might be several strategies for developing diagnostic expertise such as accumulating a mental database of patient cases, obtaining experience with a diverse range of diagnostic categories and identifying similarities in the underlying concepts of superficially distinct problems. These strategies bear similarity to Ericsson and Towne's (2010) notion of 'deliberate practice' where diagnostic skill is gained through concentration on specific aspects of diagnostic performance and the development of refined cognitive representations stored in long term working memory. As discussed by Eva (2004), while the learning of basic science mechanisms contributes towards making accurate diagnoses, it may not be *the only*

way of doing so. For nurse and pharmacist prescribers to develop diagnostic expertise, it is likely that a range of approaches, which may include newer ideas such as the use of deliberate practice, will be shown to be effective in enhancing diagnostic performance. Independent prescribing by nurses and pharmacists is still a relatively new phenomenon and new prescribers need time to mature and develop in their roles. Given the starting point of new prescribers, further research is needed on what methods or combination of methods, derived from medical training, medical practice or cognitive psychology, are most effective in enhancing their diagnostic skill.

Conclusions

Clinical reasoning underlies all types of clinical decisions including diagnostic decisions, as well as prescribing decisions, referral decisions or other decisions about patient management. Previous research suggests that diagnostic decisions are deeply intertwined with decisions about management, using the same clinical reasoning processes. In addition, everyone, when they are confronted with having to manage new symptoms, make diagnostic decisions. This suggests that privileging diagnostic decision making as being superior to, or more difficult than, prescribing decision making is conceptually flawed. This is not to say there are not difficult diagnostic and patient management decisions. Rather there are features, involving complexity and uncertainty, which are associated with some clinical decisions (e.g. both diagnostic and

management) that makes them more difficult or challenging for a practitioner to make.

The medical profession's response to nurse and pharmacist independent prescribing could be viewed as a 'last stand' and wish to maintain their professional power in the face of external threats. Independent prescribing explicitly allows for the possibility for nurses and pharmacists to make diagnoses. Indeed, doctors' perception of this professional threat may have been exacerbated by their earlier response to supplementary prescribing, when they denigrated the routine nature of the prescribing undertaken by pharmacists and nurses, and made much of the skill and defining nature of diagnosing. Although ostensibly concerned about the risks to public safety of nurse and pharmacist independent prescribing, the evidence to date, although not extensive, suggests that nurses and pharmacists can prescribe safely and appropriately.

The model for training nurse and pharmacist prescribers relies on their recognition of their areas of competence and to prescribe only within these clinical areas. Protocols and guidelines may be helpful in supporting new prescribers' decision making, particularly when they are new to their role, less confident and are able to use guidelines to help organise the incoming patient clinical information. However, as new independent prescribers mature in their role and as independent prescribing becomes more commonplace, consideration needs to be given as to how to develop the diagnostic expertise of nurse and pharmacist prescribers. The traditional medical model of learning basic science mechanisms followed

by engagement with patient clinical problems is one approach to learning how to make accurate diagnoses. But it may not be the only way. Indeed, research suggests that diagnostic performance can be enhanced through 'deliberate practice' whereby an individual intensely concentrates on a specific aspect of performance and, through feedback and coaching, is able to improve their diagnostic accuracy. Further research is needed to determine if such an approach will prove effective in developing the expertise of nurses and pharmacists in diagnosing. In conclusion, the question becomes, not can pharmacist and nurse prescribers make diagnoses, because clearly they already do. Rather the question is, is it possible for nurse and pharmacist prescribers to develop expertise and become expert diagnosticians? The answer to this surely is a cautious 'yes'.

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